Heme *b* in particulate material from the Atlantic and Southern Oceans

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Heme *b* is the iron containing prosthetic group of hemoproteins, which include *b* type cytochromes, peroxidases and catalases. We determined the heme *b* abundance in particulate material on three cruises in the Atlantic and Southern Oceans. Analysis of phytoplankton cultures indicated that we recovered approximately 18% of the total cellular iron pool in marine phytoplankton as heme *b* [1, 2]. We show that particulate heme *b* concentrations are depleted relative to particulate carbon and chlorophyll *a* in samples from the Southern Ocean and high latitude North Atlantic when compared to samples from the tropical North Atlantic Ocean. The phytoplankton communities in the Southern Ocean and high latitude North Atlantic are iron stressed during at least part of the growing season, whereas the iron supply to the tropical North Atlantic is high due to aerosol inputs. The observed lower heme *b* to carbon ratios are consistent with the patterns of iron supply and suggest a reduced capacity for photosynthetic and respiratory electron transport in high latitude phytoplankton populations. However, comparison with primary productivity determined on the same cruises showed that heme *b* use efficiency, defined as the amount of heme *b* required to fix a mole of carbon per second, was enhanced at high latitudes compared to the tropical North Atlantic. We discuss the implications of our results for phytoplankton iron requirements in the Atlantic Ocean.

[1] Gledhill (2007), *Mar. Chem.* **103**, 393. [2] Honey *et al.* (2013), *Mar. Ecol. Prog. Ser.* 243, 1.

Regional urban geochemical baseline for heavy metals and persistent organic pollutants in Dublin, Ireland (SURGE Project)

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The Dublin SURGE (Soil Urban Geochemistry) Project establishes a baseline for inorganic elements and persistent organic pollutants in topsoils in Dublin, Ireland for the first time. Topsoil samples (n=1058) of 0-10 cm depth from the greater Dublin area (430 km^2) were analysed for 31 inorganic elements by ICP-AES. A subset of 194 samples was analysed for polycyclic aromatic hydrocarbons (PAHs) and polychlorinated bipheyls by GC-MS and GC-ECD respectively.

Exploratory data analysis was carried out on the analytical results using bedrock, soil type and land use zones data to reveal natural and anthropogenic influences on soil geochemical concentrations. Box plots, histograms and cumulative probability curves indicate that concentrations of Pb, Cu, Zn, Hg and PAHs are strongly influenced by human activities in the docklands, the inner city and heavy industry areas of Dublin. Historical industry, domestic coal burning, reuse of contaminated soil and traffic emissions are likely sources.

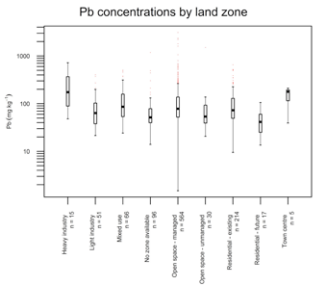

Figure 1. Box plots for Pb in topsoil showing higher median concentrations (mg/kg) in heavy industry and town centre zones.

To better understand historical anthopogenic sources of contaminants, historical industry locations were compiled and employed in a preliminary multivariate spatial analysis which demonstrates strong spatial correlations between key contaminants and certain historical industries. The project provides systematic, regional baseline data for urban soils relevant to the protection of human health, compliance with environmental legislation and urban regeneration.

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